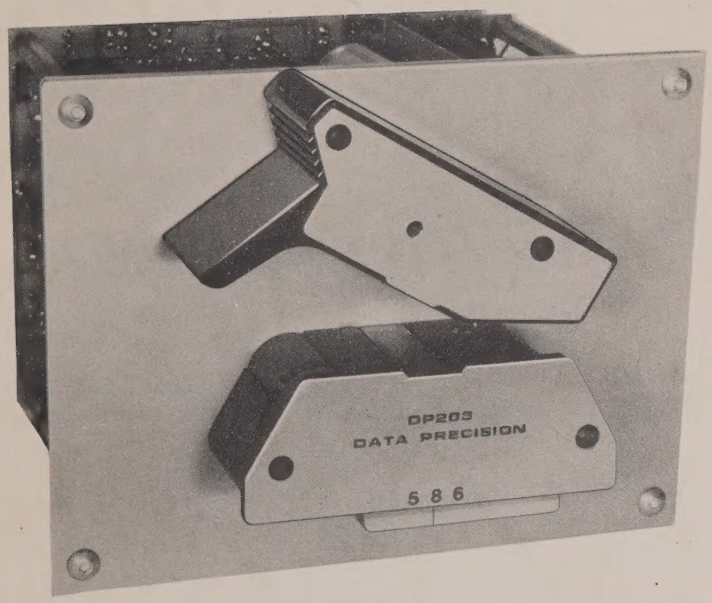
TECHNICAL MANUAL



Photoelectric Paper Tape Reader DP 203

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1. PRINCIPLES OF OPERATION

The DP 203 is a photo-electric paper tape reader of high reliability and low maintenance needs. All the read electronics are mounted on a single card at the rear of the reader with a further integral card giving power drive to the stepping motor and holding the power supply and regulation unit.

The reader can be supplied as a complete unit for customer mounting into existing panels or with 19" rack, tape spoolers, fanfold cassettes or free standing desk units.

Tape is transported by means of a sprocket wheel directly coupled to a high quality stepping motor. The tape interrogation is achieved by infra red emissions from the specially selected and "aged" LED's mounted in the sturdy lift up head. Where bits occur in the tape, these emissions are projected onto photo transistors mounted in the lower block which give signals to the read electronics. The sprocket is also interrogated and used to monitor tape feed.

5 track telegraphic tape, 6 track advanced sprocket typesetting tape and standard 8 track tapes in paper or mylar can all be read from a simple moveable slide adjustment on the lower block. By leaving solder pads open or closed on the printed circuit card, the control signals can be matched to the customer's existing electronics and the signal outputs can be selected "high" or "low" active with DTL, TTL or Open Collector compatibility.

CMOS logic is used to give high noise immunity and an integral power supply unit only requires 24 volts d.c. or 20 volts a.c. from the customer to derive all required voltage levels.

2. TECHNICAL DATA

Reading speed

Start/Stop (dynamic input) 250 characters.
Synchronous operation (static input) 250 characters. Tape tensions higher than 120 p reduce the maximum speed.

Climatic conditions

Operation: Corresponding KWF DIN 40040 (0 . . .+50°C)
Storage: Ambient temperature -25°. . .+75°C
Relative humidity 0 . . .95% (without condensation)

Voltage and current supply

24 volts DC ± 10% 1.6 Amps
or
20 volts AC 50/60 cycles ± 10% 1.6 Amps

Connections

25-Pin Cannon plug. Mating connector provided.

Paper Tape

All 5, 6 and 8 track paper tapes according to standards ECMA and DIN. Maximum tape transparency 70% for infra red.

Data outputs

DTL, TTL, Open collector

Signal outputs

All outputs are selective "high" or "low" active with DTL, TTL, Open collector compatibility.
"Busy" is active for the period of the operation of the internal timing circuit.
"Sprocket" is active for the period of the tape transport hole appearing under its respective LED/Photocell.
"Error" is active at the end of tape (EOT) or should tight tape (TT) or torn transport holes be detected.
"Flap" is active whilst the read head cover is open for tape loading or withdrawal. "Busy" is also active in this condition.

Control Signals

DTL, TTL or Open collector selective high or low.

"CCWED" Anti-clockwise rotation dynamically pulsed. "Active" on leading edge of incoming signal. Minimum pulse width 1 u second up to maximum rate of 250 characters per second.
"CWED" as above but clockwise rotation.
"CCWES" Anti-clockwise rotation static input. Changing the "active" level on this input causes the reader to step continuously anti-clockwise at the maximum rate of the internal timing circuit.
"CWES" as above but clockwise rotation.
"Reverse". This level "Active" input is used to reverse the direction of rotation of the reader overiding CCWED or CCWES.
"BIAS" Voltage selectable to suit open collector operation of input signals.
+5 Volts is available by coupling an internal link.

N.B. The maximum permitted voltage on the "Bias" input is +30 volts.

"Stand By". This level "Active" input causes the current fed to the stepping motor to be switched off. The drive capstan (tape transport) can then free wheel.

N.B. If the stepping motor is not given a step instruction within a period of 20 milliseconds from the previous drive pulse, an internal circuit switches the current to the stepping motor to a holding level to reduce power consumption.

"Reset". This level "Active" input resets the internal logic to a ready to go state.

N.B. "Flap" operation also causes reset to function.

"Internal Power Supply". The internal power card can be fed with either 24 volts DC or 20 volts single phase 50/60 cycle AC. If AC input is given to the reader, this is rectified by the bridge rectifier to give 24 volts DC.

The 24 volts DC is used to provide power for the stepping motor and also the logic levels are derived internally from this DC voltage.

The input voltage is selectable through:-

(a) The 25 pin Cannon connector.
(b) The fast on terminals on the power card.

If (a) is used, then depending upon whether AC or DC input is required, this is selected by means of wire links.

If (b) is used and no power is required to be fed to the Cannon output sockets for operation of the external system, the links mentioned above must not be connected.

Weight (basic unit) approximately 1.58 kilo
3.47 lbs.

FIG.1 GENERAL ARRANGEMENT

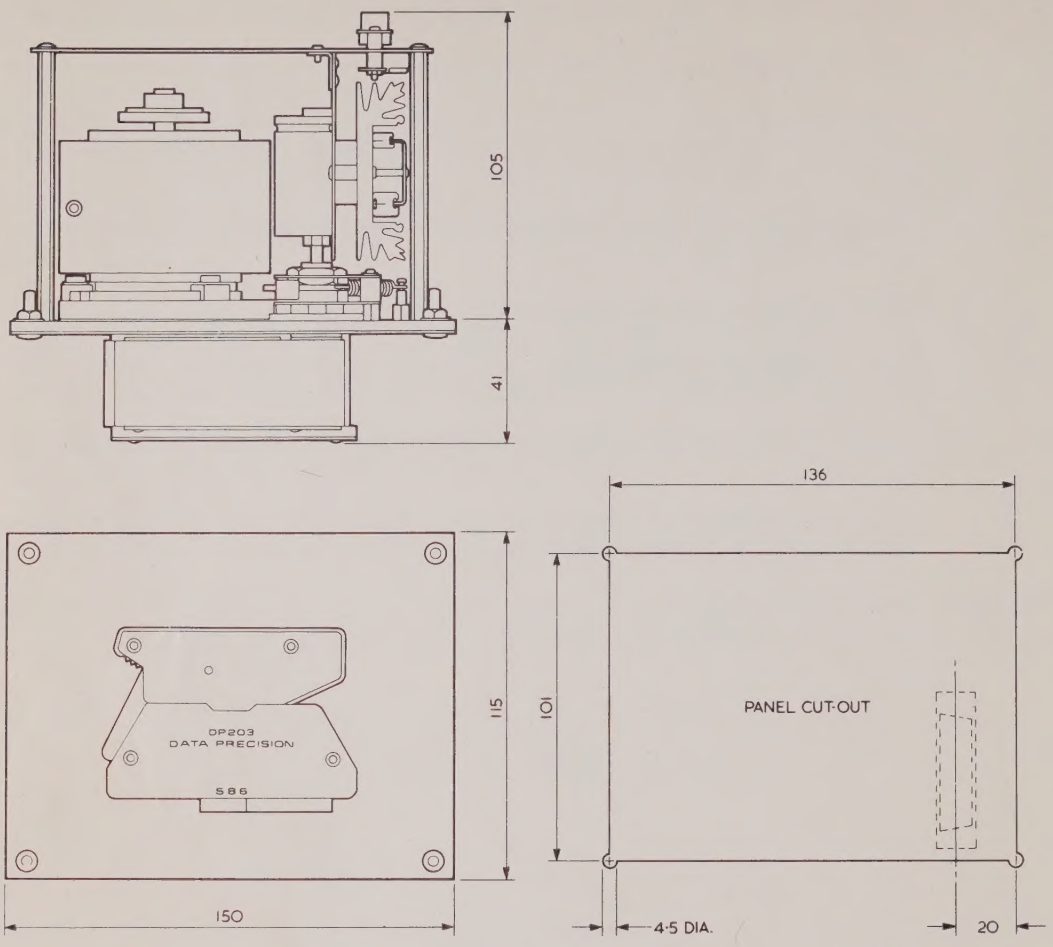
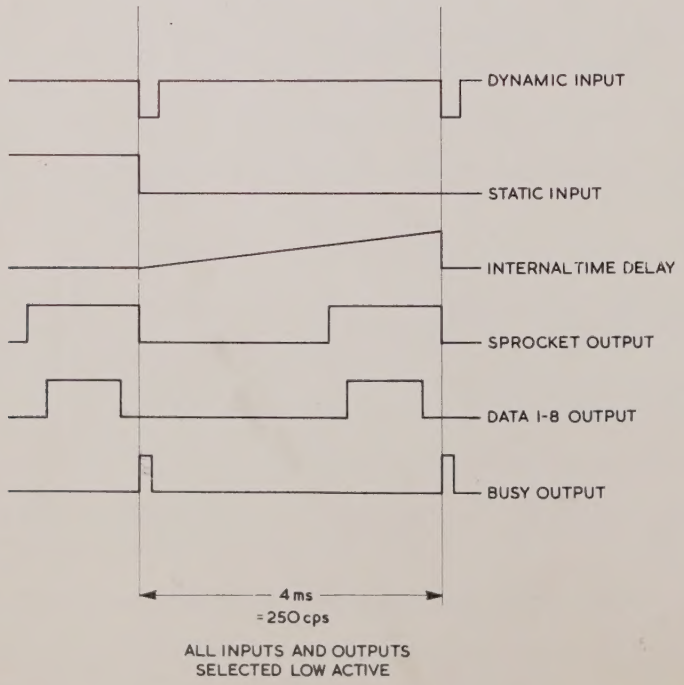


FIG. 2 PULSE DIAGRAM



ALL INPUTS AND OUTPUTS
SELECTED LOW ACTIVE

FIG. 3 DP 203 TAPE READER CIRCUIT DIAGRAM (Ref.Drg. 13-702)

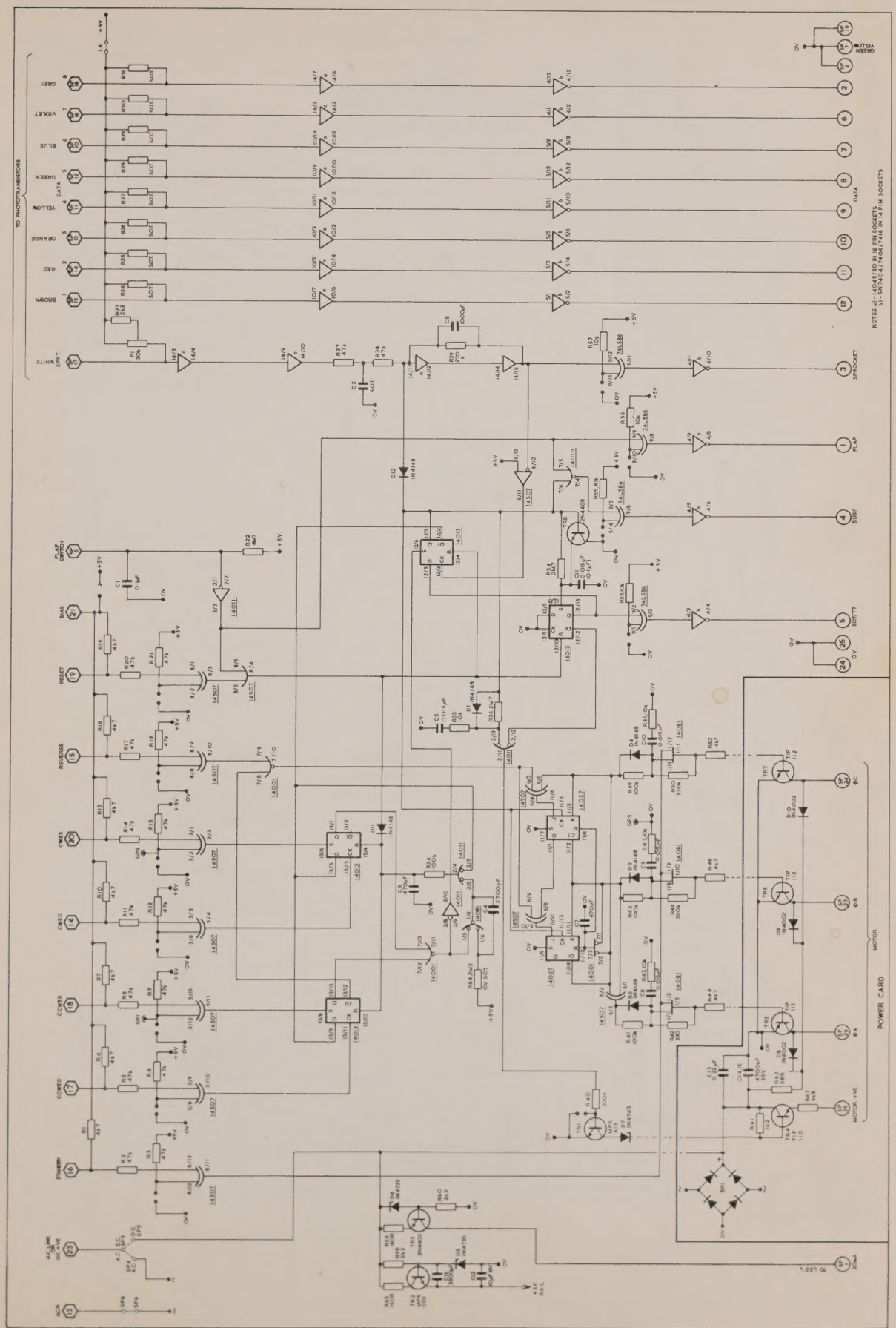
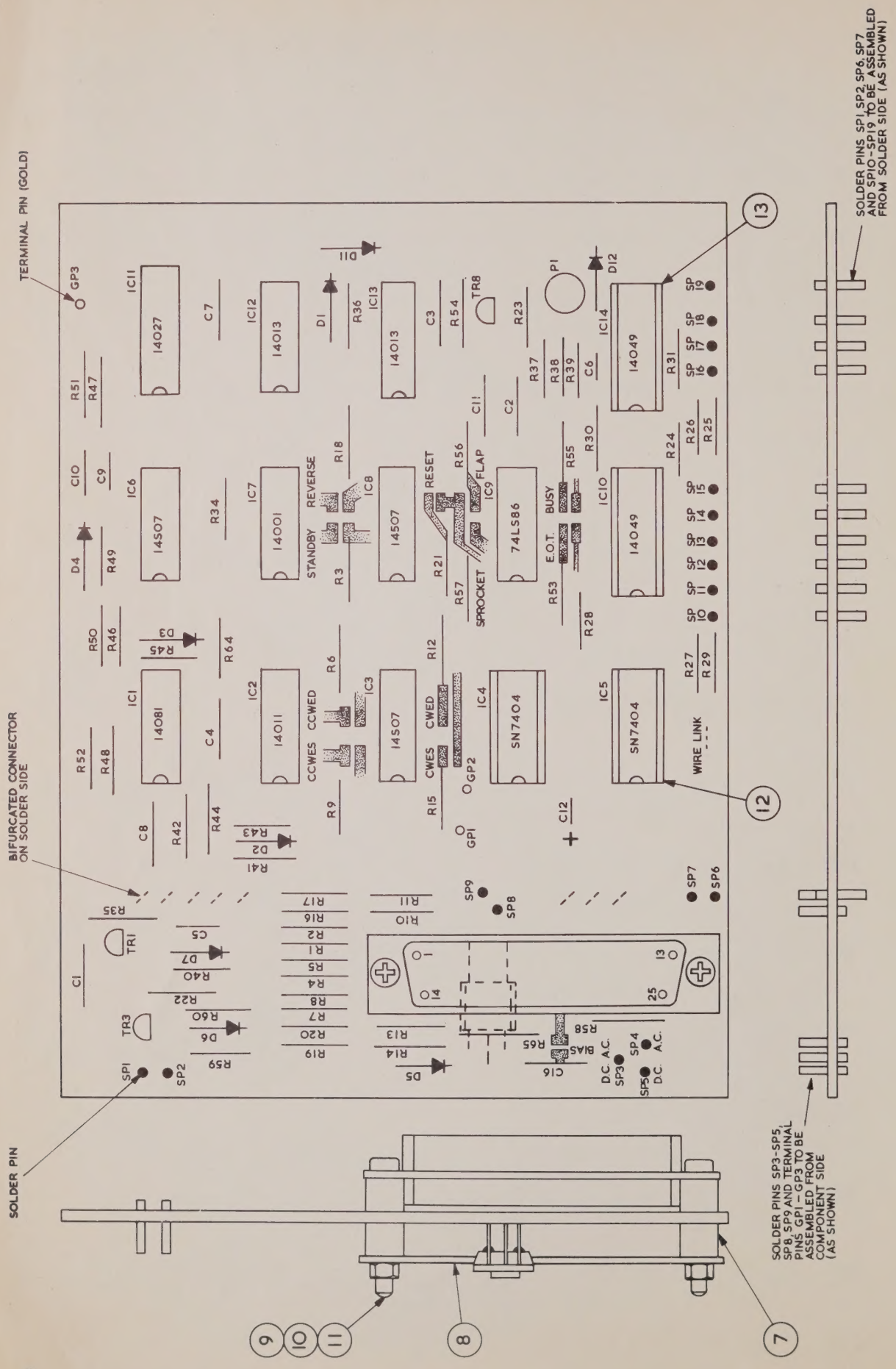


FIG. 4 DP 203 TAPE READER COMPONENT LAYOUT (Ref. Drg. 13-7021)



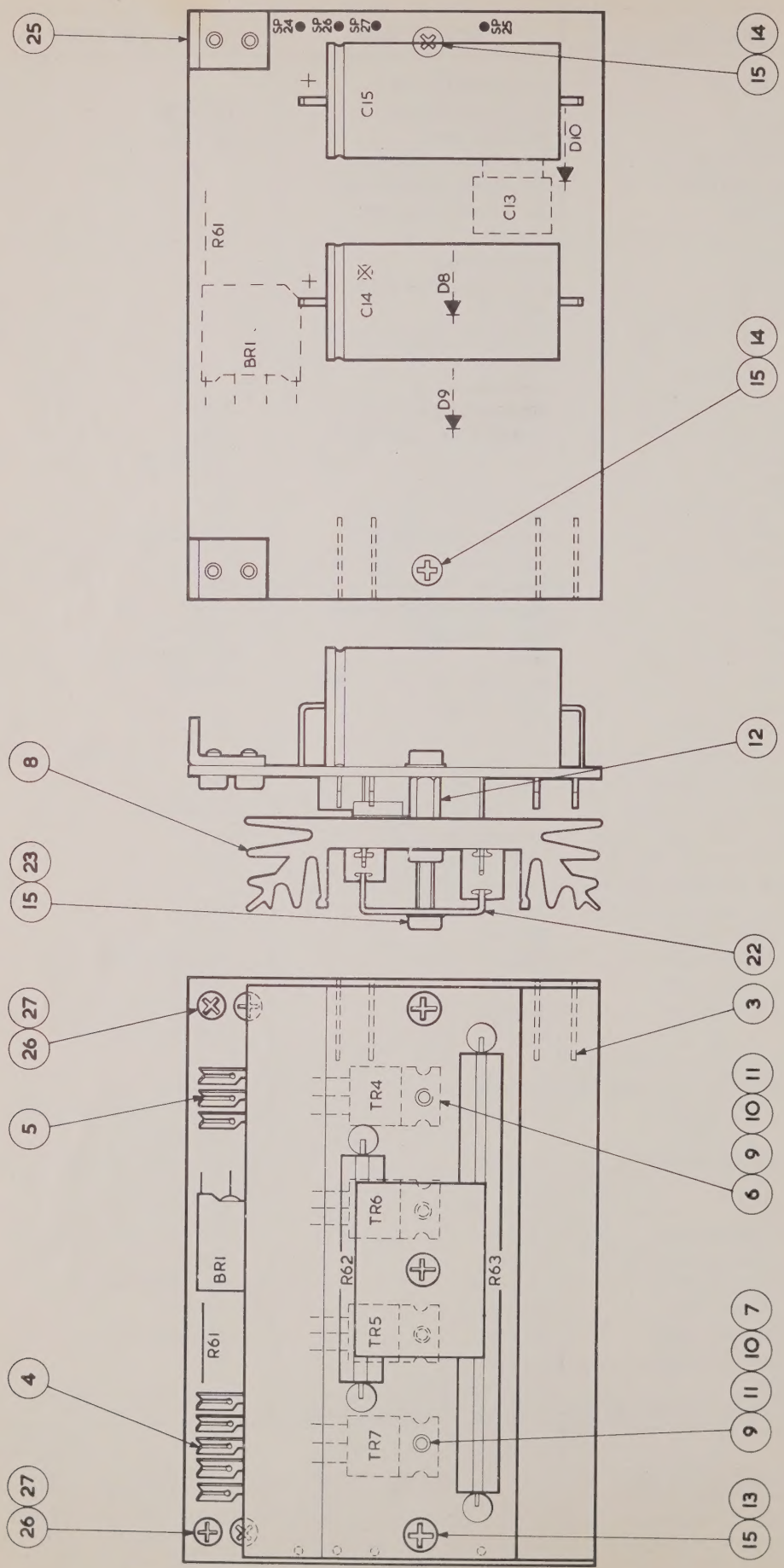
COMPONENT LAYOUT PARTS LIST (Refer to Fig. 4)

ITEM	PART NO.	DESCRIPTION	COMPONENT REF.	QTY
1	13-702 issue 2	Printed circuit board		1
2	H2008	Pin hot tin dipped	SP1-SP19	19
3	SN/050/RP	Snale connector	GP1-GP3	3
4	02-005-113-6150	Varicon connector 5 way		1
5	02-003-113-6150	Varicon connector 3 way		1
6	DB 25P OL2	Connector 24 way plug		1
7	13-508	Spacer		4
8	13-2100	Heatsink assy.		1
9	M 2.5 x 18	Pan hd. pozidrive screw		2
10	M 2.5	Half nut		2
11	M 2.5	Washer int. shakeproof		2
12	-	Socket D.I.L. 14		2
13	-	Socket D.I.L. 16		2
14	MC 14001 CP	Quad 2-input NOR gate	IC7	1
15	MC 14011 CP	Quad 2-input NAND gate	IC2	1
16	MC 14013 CP	Dual 'D' flip flop	IC12, IC13	2
17	MC 14027 CP	Dual J-K flip flop	IC11	1
18	MC 14081 CP	Quad 2-input AND gate	IC1	1
19	MC 14507 CP	Quad exclusive OR gate	IC3, IC6, IC8	3
20	SN74LS86N	Low power SHOTTKY quad exclusive OR gate	IC9	1
21	MPS A13	NPN Darlington transistor	TR1	1
22	2N 4403	PNP Transistor	TR3, TR8	2
23	1N 4148	Diode	D1-D4, D11, D12	6
24	1N 4735A	Zener diode	D5, D6	2
25	1N 4743A	Zener diode	D7	1
26	HS 3300pF 10% 30V	Film capacitor	C16	1
27	FKS 2 MIN 1000pF 20% 100V	Film capacitor	C6	1
28	HS 4700pF 10% 30V	Film capacitor	C4	1
29	MKS 0.015uF 10% 100V	Film capacitor	C5, C8-C11	5
30	MKS 0.1uF 20% 100V	Film capacitor	C1	1
31	TANT. CAP 10uF 16V	TANT. capacitor	C12	1
32	FKS 2 MIN 4700pF 20% 100V	Film capacitor	C2	1
33	HS 470pF 10% 30V	Film capacitor	C3, C7	2
34	2 MO 180R 5% 0.5W	Resistor	R59	1
35	2 MO 2K2 5% 0.5W	Resistor	R23, R58, R60	3
36	W/W 150R 5% 2.5W	Resistor	R65	1
37	3 MO 4K7 5% 0.5W	Resistor	R1, R4, R7, R10, R13, R16, R19, R44, R48, R52	10
38	2 MO – S.O.T. from 47K, 5K6, 6K8, 8K2, 10K, 12K, 15K, 18K	Resistor	R24-R31	8
39	2 MO 10K 5% 0.5W	Resistor	R35, R43, R47, R51, R53, R55, R56, R57	8
40	2 MO 47K 5% 0.5W	Resistor	R2, R3, R5, R6, R8, R9, R11, R12, R14, R15, R17, R18, R20, R21, R37, R38	16
41	2 MO 100K 5% 0.5W	Resistor	R34, R40, R41, R45, R49	5
42	2 MO 270K 5% 0.5W	Resistor	R39	1
43	2 MO 330K 5% 0.5W	Resistor	R42, R46, R50	3
44	2 MO 1M 5% 0.5W	Resistor	R64	1
45	5 CA 2M7 10% 0.3W	Resistor	R36, R54	2
46	5 CA 5M7 10% 0.3W	Resistor	R22	1
47	20K 10%	Cermet trimmer	P1	1

Hex. Inverter (items 48 & 49) See table below for alternative part nos.

ITEM	TAPE READER ASSY. NOS.						COMPONENT REF.	QTY.
	13-1000	13-1001	13-1002	13-1003	13-1004	13-1005		
48	SN7404N	SN7404N	SN7406N	SN7406N	SN7416N	SN7416N	IC4, IC5	2
49	MC14049CP	MC14050CP	MC14049CP	MC14050CP	MC14049CP	MC14050CP	IC10, IC14	2

FIG. 5 DP 203 TAPE READER POWER BOARD ASSEMBLY (Ref. Drg. 13-7031)



POWER BOARD ASSEMBLY PARTS LIST (Refer to Fig. 5)

ITEM	PART NO.	DESCRIPTION	COMPONENT REF.	QTY.
1	13-703 issue 2	Printed circuit board		1
2	H2088	Pin hot tin dipped	SP24 - SP27	4
3		Contact 3/16"		4
4	02-005-113-6150	Varicon connector 5 way		1
5	02-003-113-6150	Varicon connector 3 way		1
6	TIP 110	NPN Power transistor	TR4	1
7	TIP 112	NPN Power transistor	TR5, TR6, TR7	3
8	13-101	Power heat sink		1
9	M3 x 6	Pan hd. pozidrive screw		4
10	Supplied with items 6 & 7	Mica spacer		4
11	Supplied with items 6 & 7	Nylon bush		4
12	13-S19	Spacer		2
13	M3 x 8	Pan hd. pozidrive screw		2
14	M3 x 5	Pan hd. pozidrive screw		2
15	M3	Washer int. shakeproof		5
16	1N4002	Diode	D8, D9, D10	3
17	261-491	Bridge rectifier	BR1	1
18	MKS 0.2µF 20% 63V	Film capacitor	C13	1
19	Printilyt 2200µF 20% 35V	Electrolytic capacitor	C14, C15	2
20	218-0 6R8 10% 17W	Resistor W/W	R63	1
21	210-0 68R 10% 7W	Resistor W/W	R62	1
22	13-207	Resistor clamp plate		1
23	M3 x 20	Pan hd. pozidrive screw		1
24	2MO 1K2 5% 0.5W	Resistor	R61	1
25	13-209	Power card mounting bkt.		2
26	M2.5 x 5	Pan hd. pozidrive screw		4
27	M2.5	Washer int. shakeproof		4

3. CANNON CONNECTOR TERMINATIONS FOR DP 203 TAPE READER

1	Flap output	13	AC. N. Input
2	Date 8	14	Clockwise dynamic
3	Sprocket	15	Reverse drive
4	Busy	16	Standby (motor free)
5	E.O.T. T.T.	17	Counter clockwise dynamic
6	Data 7	18	Counter clockwise static
7	Data 6	19	Reset logic
8	Data 5	20	Clockwise static
9	Data 4	21	Bias line
10	Data 3	22	Not connected
11	Data 2	23	DC 24 volt/AC line input
12	Data 1	24	)
		25	) 0.V.

N.B. Additional AC/DC power inputs are available on power card.

If AC or DC is applied through the Cannon plug, then link SP3 to SP5 for DC (24 volts) and link SP3 to SP4 and SP8 to SP9 for AC (20 volts).

4. ADJUSTMENTS

a) **Change of an LED or photo transistor**

1. Remove the respective screws on the front panel (LED's are in top section of read head and photo transistors are in bottom section) and remove the supporting printed circuit card holding the LED's or photo transistors.

2. Unsolder the faulty component, remove and replace with new. Resolder respective wire.

3. Replace the printed circuit card and the front panel and screws.

4. Setting up:

   Using a Mylar tape loop with alternate pattern of "no holes" or "all holes", run the stepping motor at maximum speed (CCWES (Pin 15) to ground).

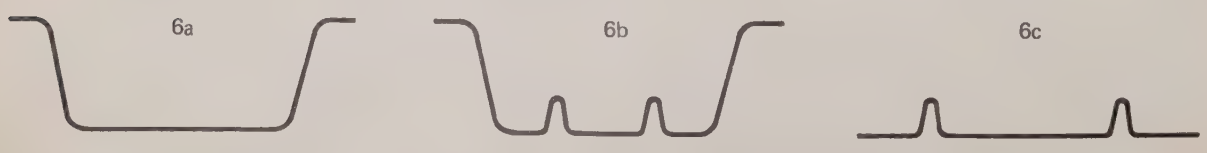
   If the sprocket hole LED or photo transistor were replaced, then the reader will only run if there is an operating signal available on the collector of the photo transistor.

   (Refer to Fig. 3, Circuit Diagram and P1 and R24 to R31). As these resistors are matched in manufacture to the individual LED's or photo transistors. it may be necessary to replace the resistor which refers to that track which has been changed.

   (Refer to Fig. 6, Photo Transistor Resistor Selection Diagram). Change the load resistor to a value which saturates the photo transistor as in Fig. 6a. Figs. 6b and 6c show that incorrect resistor value has been selected.

   N.B. Pins SP10 to SP18 both inclusive, relate to photo transistor monitoring points to which the oscilloscope should be connected.

FIG. 6 PHOTO TRANSISTOR RESISTOR SELECTION DIAGRAM



N.B. As LED's and photo-cells are specially "aged" before assembly and are tested for angle and output conformity, they should be purchased direct from Data Precision Ltd. or their accredited agents.

b) Adjustment of the sprocket wheel

Provide power to the reader to give a holding torque to the stepping motor.

Load a piece of tape having consecutive all holes punched and place it over the read head area above the photo transistors. The positioning of the sprocket wheel can now be carried out as follows:

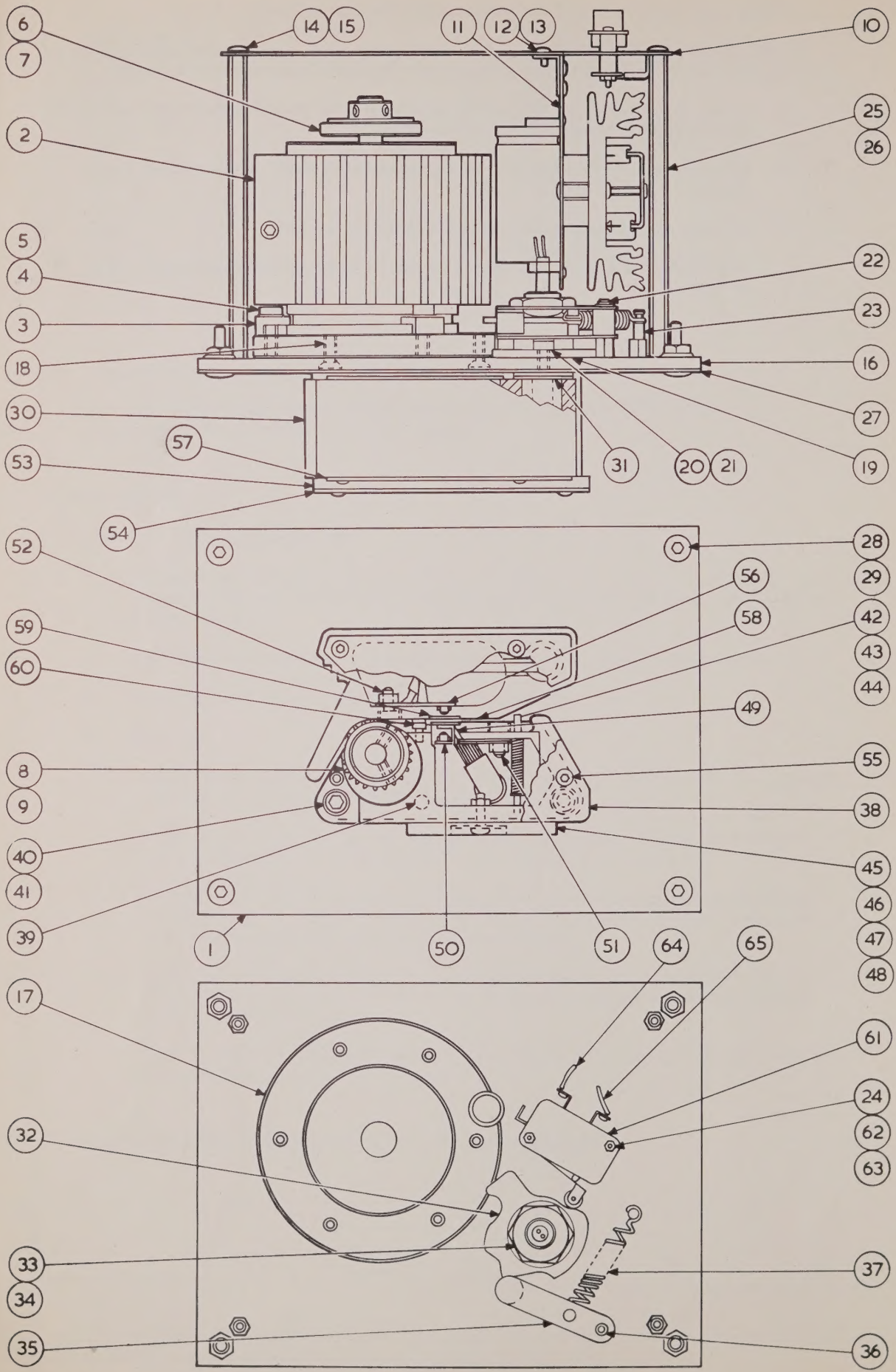
1. Loosen the stepping motor heat sink and withdraw it to the rear sufficiently to give access to the three motor servo clamps which should be loosened.

2. Rotate motor unit until a tape sprocket hole is seen to be directly over the sprocket photo transistor.

3. Retighten the three motor servo clamps and replace the heat sink.

   N.B. After carrying out this adjustment, test that the reader runs at the same speed in either direction.

FIG. 7 DP 203 TAPE READER MAIN MECHANICAL ASSEMBLY



MAIN MECHANICAL ASSEMBLY PARTS LIST (Refer to Fig. 7)

ITEM	PART NO.	DESCRIPTION	QTY.
1	13-0001	Main mechanical assembly	1
2	-	Motor	1
3	13-518	Motor clamp	3
4	M4 x 12	Skt. hd. cap screw	3
5	Type 'A' M4	Single coil spring washer	3
6	-	Damper	1
7	M3 x 3	Skt. hd. grub screw cup point	2
8	13-516	Sprocket wheel	1
9	M3 x 5	Skt. hd. grub screw cup point	2
10	13-7021	Control logic card assembly	1
11	13-7031	Power card assembly	1
12	M2.5 x 5	Pan hd. pozidrive screw	2
13	M2.5	Washer internal shakeproof	2
14	M3 x 8	Pan hd. pozidrive screw	4
15	M3	Washer internal shakeproof	4
16	13-2010	Mounting plate assembly	1
17	13-504	Mounting bush	1
18	M4 x 10	Csk. hd. pozidrive screw	3
19	13-507	Flap bush	1
20	M3 x 5	Skt. hd. cap screw	2
21	Type 'A' M3	Single coil spring washer	2
22	13-513	Detent pillar	1
23	13-515	Spring pillar	1
24	13-514	Switch pillar	2
25	13-503	Spacer - long	4
26	M3	Belleville washer	8
27	13-202	Front plate	1
28	M4 x 12	Button hd. socket screw	4
29	-	Nut with washer	4
30	13-1040	Upper head block assembly	1
31	13-802	Mylar washer	1
32	13-213	Cam	1
33	M8	Stamped washer form 'A'	1
34	M8	Hexagon lock nut	1
35	13-2120	Detent arm assembly	1
36	87-DIN 2, 3	Circlip 'E' type	1
37	13-402	Tension spring	1
38	13-103	Lower head block	1
39	4 mm dia. x 10 mm long	Dowel pin	1
40	M4 x 12	Skt. hd. cap screw	2
41	Type 'A' M4	Single coil spring washer	2
42	13-505	Selector pin	4
43	13-401	Compression spring	4
44	44-DIN-1, 2	Circlip 'E' type	4
45	13-801	Tape selector slide	1
46	M3 x 10	Pan hd. pozidrive screw	1
47	M3	Lock nut	1
48	M3	Washer internal shakeproof	1
49	13-208	Photo mask	1
50	13-7041	Sensor card assembly	1
51	13-102	Card retainer plate	2
52	13-506	Card mounting screw	4
53	13-204	Lower front cover spacer	1
54	13-203	Lower front cover	1
55	M3 x 8	Button hd. socket screw	4
56	13-7011	Emitter card assembly	1

MAIN MECHANICAL ASSEMBLY PARTS LIST (continued)

ITEM	PART NO.	DESCRIPTION	QTY.
57	13-205	Upper front cover	1
58	13-901	Lower dust plate	1
59	13-902	Upper dust plate	1
60	13-517	Flap stop	1
61	XFC 53-S1	Microswitch	1
62	M2.5	Washer internal shakeproof	2
63	M2.5	Lock nut	2
64	DEF 61-12 (part 6) type 1	Wire yellow/green 180mm long	1
65	DEF 61-12 (part 6) type 1	Wire grey/blue 180mm long	1

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